BLOW-OFF VALVE FOR A HYDRAULIC DASHPOT

Description

The present invention concerns a blow-off valve for a hydraulic dashpot as recited in the preamble to Claim 1.

Hydraulic dashpots are employed to absorb shock accompanying the motion of wheel suspensions attached by way of springs, preferably in motor vehicles. The shock is absorbed by forcing fluid through preferably spring-loaded ports in a piston from one compartment and into another in a fluid-charged cylinder.

When obstacles in the road are driven over rapidly, the absorption is high enough to introduce sudden forces into the suspension due to the dashpot operating too "hard". The use of blow-off valves that respond and permit fluid to flow from the compartment more remote from the piston rod and into the compartment adjacent thereto is accordingly known from German 2 340 987. Such valves do not respond, however, while the dashpot is operating normally.

There are drawbacks to the blow-off system disclosed in German 2 340 987 A1. First, it is controlled by controls inside the piston rod. Again, the hydraulic blow-off flow also travels through the piston rod. Such an approach cannot be employed if the piston-rod bore also accommodates other controls and flow

diverters or electric and pneumatic lines as in the embodiment known from German 10 138 487 C1 for example.

The object of the present invention is accordingly a hydraulic dashpot blow-off valve that can be accommodated along with the hydraulic lines that serve it outside the piston rod or an extension thereof.

This object is attained in accordance with the present invention by the characteristics recited in Claim 1. Claim 2 recites an advantageous advanced embodiment.

The present invention has several advantages. In particular, the blow-off valve can be employed in dashpots that have piston rods already accommodating subassemblies and other components in a central bore. The valve can also be installed subsequently in dashpots with any combination of piston rod and valve to comply with the overall vehicle design.

One embodiment of the present invention will now be specified by way of example with reference to the accompanying drawing, which comprises a single figure, a section through a dashpot in the vicinity of the piston.

The dashpot includes a fluid-charged cylinder 1. A shock-

absorbing piston 3 travels back and forth inside piston 3 on the end of a piston rod 2. The piston is provided with breaches 4 and with shock-absorbing valves in the form of a stack 5 of resilient discs. It partitions the dashpot into two compartments 6 and 7. With piston rod 2 traveling in the suction phase, the fluid will flow out of upper compartment 6 and into lower compartment 7 through piston 3, decelerated by breaches 4 and stack 5. In the compression phase, the fluid will flow through piston 3 from lower compartment 7 and into upper compartment 6.

The piston rod 2 in the illustrated embodiment is provided with an extension 8, upon which piston 3, stack 5, etc. are mounted, secured at the bottom by a threaded nut 9 and a washer 10. Extension 8 is screwed into the hollow piston rod 2 at a narrow section 11.

A bore 12 extends along the center of piston rod 2 and accommodates schematically illustrated operating components 13.

Extension 8 is provided in the vicinity of piston 3, stack 5, nut 9, and washer 10 with at least one axially extending inwardly undulating groove 14. Groove 14 merges into a ring 15 above the uppermost disc in stack 5. Ring 15 can be either a separate component mounted on the extension as in the illustrated example, or integrated into it. Although the drawing represents only one

groove 14, at least four are usually employed, distributed equally along the circumference.

The surface of ring 15 facing away from piston 3 is surrounded by an annular depression 16 surrounded in turn by an annular bed 17. Above depression 16 and resting on bed 17 is a spring-loaded disc 18. Disc 18 is less flexible than the discs in stack 5. Depression 16 communicates hydraulically with grooves 14. Depression 16 can be capped with a stack of discs like stack 5 instead of with the single disc 18.

Disc 18 is rigid enough to prevent it from lifting off of bed 17 in normal operation, during which the shock is absorbed by stack 5. Only when the dashpot is subjected to shock due to the vehicle being driven at high speed over a large obstacle in the road will the blow-off valve comprising disc 18 and bed 17 respond. In this event, piston rod 2 will travel into cylinder 1, and the pressure in upper compartment 6 will increase suddenly. Only now can the fluid flow through groove 14, breach 19, and depression 16, with disc 18 lifting off of bed 17.

In one alternative to the illustrated embodiment, groove 14 can extend through stack 5, piston 3, and nut 9 instead of through extension 8. This approach, however, entails the drawback that the various components must be very precisely aligned, and it

should be considered only when there is not enough material in the extension to accommodate groove 14 at that point.